

INCH-POUND

MIL-C-46931F(AR)  
 29 March 1991  
 SUPERSEDING  
 MIL-C-46931E(AR)  
 31 March 1989

## MILITARY SPECIFICATION

CARTRIDGE, 7.62mm: NATO, BALL, M80

This specification is approved for use by the U.S. Army Armament, Munitions and Chemical Command and is available for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE.

1.1 Scope. This specification covers the Cartridge, 7.62mm: NATO, Ball, M80 for use in 7.62mm weapons.

## 2. APPLICABLE DOCUMENTS.

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. The following specifications, standards and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issue of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

## SPECIFICATIONS

## MILITARY

MIL-A-48078 -Ammunition, Standard Quality Assurance Provisions, General Specifications for

## STANDARDS

## MILITARY

MIL-STD-105 -Sampling Procedures and Tables for Inspection by Attributes  
 MIL-STD-109 -Quality Assurance Terms and Definitions

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, U.S. Army ARDEC, ATTN: SMCAR-BAC-S, Picatinny Arsenal, New Jersey 07806-5000 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 1305

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MIL-STD-636	-Visual Inspection Standards for Small Arms Ammunition Through Caliber .50
MIL-STD-644	-Visual Inspection Standards and Inspection Procedures for Inspection of Packaging, Packing and Marking of Small Arms Ammunition
MIL-STD-1168	-Lot Numbering of Ammunition
MIL-STD-1170	-Visual Standards and Comparison Methods for Evaluating Grain Configuration in 7.62mm Cartridge Cases

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from: Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

## DRAWINGS

US ARMY ARMAMENT RESEARCH, DEVELOPMENT, AND ENGINEERING CENTER (ARDEC)

## PRODUCT AND PACKAGING DRAWINGS

10521998	-Cartridges, 7.62mm, NATO; Ball, M80
7553708	-Packing and Marking, Cartridges 7.62mm, NATO; Cartons, Box, Ammunition M19A1; Box Wirebound
7643674	-Classification of Cartridge Case Defects
8593306	-Packing and Marking, Cartridge, 7.62mm NATO; Linked: Box Ammunition, M19A1; Box, Wirebound (functional)
8597306	-Packing and Marking, Cartridge, 7.62mm, NATO; Linked; Cartons; Bandoleers; Box Ammunition, M19A1; Box, Wirebound (functional)
10521861	-Packing and Marking, Cartridges 7.62mm, NATO; Linked, Cartons; Bandoleers; Box, Ammunition, M19A1; Box, Wirebound
10535780	-Packing Cartridges, 7.62mm, Linked, Shipping and Storage Container, M548 (functional)

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10535781	-Marking, Cartridges, 7.62mm, Linked, Shipping and Storage Container, M548 (functional)
9362607	-Packing and Marking for Box, Wirebound for Cartridge, 7.62mm

INSPECTION EQUIPMENT DRAWINGS

L110521998	-Index of Inspection Equipment List for: Cartridge, 7.62mm, NATO, Ball, M80
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PUBLICATIONS

DEPARTMENT OF DEFENSE

SCATP-7.62	-Ammunition Ballistic Acceptance Test Methods, Test Procedures for 7.62mm Cartridges
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(Copies of drawings and publications required by contractors in connection with specific procurement functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are indicated as DOD adopted shall be the issue listed in the current DoDISS specified in the solicitation.

ASTM-E92	-Vickers Hardness of Metallic Materials, Test Methods for
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(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulation unless specific exemption has been obtained.

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## 3. REQUIREMENTS

3.1 Cartridges. The cartridge shall comply with all requirements specified on Drawing 10521998, all associated drawings and with all requirements specified in applicable specifications and standards.

3.1.1 Material. All materials shall be in accordance with the applicable drawings, specifications and standards.

3.1.2 Parts. All parts shall comply with the applicable drawings, specifications and standards.

3.2 Bullet extraction. The force required to extract the bullet from the cartridge case shall be not less than 60 pounds.

3.3 Residual stress. The cartridge case shall not split when subjected to a one percent mercurous nitrate solution for 15 minutes.

3.4 Waterproof. The cartridge shall not release more than one bubble of air when subjected to a pressure differential of 7 1/2 psi for 30 seconds.

3.5 Accuracy. The average of the mean radii of all targets of the sample cartridges, fired in standard accuracy test weapons over a range of 600 yards, shall not exceed 5.0 inches for ammunition scheduled for packaging in cartons or clips, nor 7.50 inches for ammunition scheduled for packaging in links.

3.6 Action time. The action time (overall primer ignition, propellant burning and bullet-barrel time) of the sample cartridges conditioned for not less than 2 hours at 68° to 72°F, shall not exceed 4 milliseconds.

3.7 Temperature tests. The chamber pressure, velocity and function and casualty requirements of the sample cartridges subjected to each of the following storage conditions shall be as noted in the applicable sub-paragraphs:

a. Conditioned at 70°F for not less than 2 hours and fired at that temperature.

b. Conditioned at 125°F for 4 to 12 hours and fired at that temperature.

c. Conditioned at -65°F for not less than 6 hours and fired at that temperature.

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3.7.1 Chamber pressure. The chamber pressure measurement shall be performed by either the copper-crush cylinder or EPVAT test method. However, the test method employed shall be recorded on the test results.

3.7.1.1 Chamber pressure measurement at 70°F by copper-crush cylinder test method. The average chamber pressure of the sample cartridges conditioned at 70°F shall not exceed 50,000 pounds per square inch (psi). The average chamber pressure plus three standard deviations of chamber pressure shall not exceed 55,000 psi. The chamber pressure of an individual sample cartridge shall not exceed 55,000 psi.

3.7.1.2 Chamber pressure measurement at 70°F by EPVAT test method. The average chamber pressure of the sample cartridges conditioned at 70°F shall not exceed 365 MegaPascals (MPa) (52,940 psi). The average chamber pressure plus three standard deviations of the chamber pressure shall not exceed 400 MPa (58,016 psi). The chamber pressure of an individual sample cartridge shall not exceed 400 MPa (58,016 psi).

3.7.1.3 Chamber pressure measurement at 125°F and -65°F by copper-crush cylinder test. The average chamber pressure of the sample cartridges subjected to 125°F and -65°F storage conditions shall not exceed 55,000 psi nor vary by more than plus (+) 7,500 psi or minus (-) 15,000 psi from the average chamber pressure of the sample cartridges of the same lot tested for the requirements of 3.7.1.1.

3.7.1.4 Chamber pressure measurement at 125°F and -65°F by EPVAT test method. The average chamber pressure of the sample cartridges subjected to 125°F and -65°F storage conditions shall not exceed 400 MPa (58,016 psi) nor vary by more than plus (+) 50 MPa (7,252 psi) or minus (-) 100 MPa (14,504 psi) from the average chamber pressure of the sample cartridges of the same lot tested for the requirements of 3.7.1.2.

3.7.1.5 Velocity. The average velocity of the sample cartridge conditioned at 70°F, shall be 2,750 feet per second (ft/sec) plus or minus 30 ft/sec at 78 feet from the muzzle of the weapon. The standard deviation of the velocities shall not exceed 32 ft/sec.

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3.7.1.6 Velocity. The average velocity of the sample cartridges subjected to 125°F and -65°F storage conditions shall not vary from the average velocity of the sample cartridges of the same lot conditioned at 70°F by more than plus (+)150 or minus (-)250 ft/sec.

3.7.1.7 Function and casualty. The sample cartridges subjected to 70°F, 125°F and -65°F storage conditions shall function without casualty.

3.8 Port pressure. The port pressure measurement can be performed by either the copper-crush cylinder or EPVAT test method. The average port pressure of the sample cartridges when conditioned for not less than 2 hours at 68° to 72°F and fired at that temperature shall be as noted in the applicable sub-paragraphs:

3.8.1 Measurement by copper-crush cylinder test method. The average port pressure of the sample cartridges shall be 12,500 psi  $\pm$  2,000 psi.

3.8.2 Measurement by EPVAT test method. The average port pressure of the sample cartridges shall not be greater than 85 MPa (12,238 psi) and shall not be less than 60 MPa (8,702 psi).

3.9 Stripping. The jacket of the bullet, or any part thereof, shall not strip from the slug when the cartridge is fired.

3.10 Barrel erosion. The average life per barrel of 3 barrels shall be not less than 5,000 rounds. The barrel life shall be considered as having ended when the average velocity of an individual burst in the test drops 200 ft/sec or more with respect to that of the initial burst in the test or when the bullets from twenty percent or more of the cartridges in any burst show keyholing which is defined as yaw exceeding 15° at 1,000 inches range, whichever comes first.

3.11 Grain configuration. The grain configuration of the sidewall of the finished cartridge case shall fall within the range defined by the grain configuration standards illustrated in MIL-STD-1170, Figures 1 through 6.

3.12 Workmanship. The requirements for workmanship are as specified on the applicable drawings, referenced specifications and the following: The metal parts of the cartridge shall be free of cracks, splits, perforations, burrs and foreign matter. The cleaning method used shall not be injurious to any part, nor shall the parts be contaminated by any cleaning agent. All parts

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and assemblies shall be fabricated, loaded and assembled in a thorough and workmanlike manner. In addition, the cartridge shall comply with the standards specified in the 7.62mm section of MIL-STD-636. Extreme care should be exercised to avoid contamination of primers or propellant by oil, grease or other foreign matter.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Quality assurance terms and definitions. Reference shall be made to MIL-STD-109 for definition of quality assurance terms.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

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4.3 First article inspection.

4.3.1 Submission. The contractor shall submit a first article sample as designated by the Contracting Officer for evaluation in accordance with the provisions of 4.3.2. The first article sample shall be manufactured using the same materials, equipment, process and procedures as will be used in regular production. All parts and materials including packaging and packing shall be the same as used for regular production and shall be obtained from the same source. The first article sample shall consist of the following items in sample quantities as indicated below:

<u>Part Description</u>	<u>Drawing</u>	<u>Quantity</u>
Cartridge, 7.62mm NATO Ball, M80	10521998	19,290
Slug	8595667	5/each final station/each machine
Jacket	8595668	5/each final station/each machine
Bullet	8595669	5/each final station/each machine
Case	10523997	5/each final station/each machine

4.3.2 Inspection to be performed. See MIL-A-48078 and Tables I and II specified herein.

4.3.3 Rejection. See MIL-A-48078 and Tables I and II specified herein.

4.3.3.1 Function and casualty. The sample shall be rejected if any defect from function and casualty testing plus firing defects observed in all other firing tests exceeds the acceptance numbers specified in Table II.



TABLE I. First article inspection

## CLASSIFICATION OF DEFECTS &amp; TESTS

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PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	SHEET 1 OF 5		DRAWING NUMBER
				AQL OR 100%	REQUIREMENT PARAGRAPH	
	Cartridge, 7.62mm, NATO, Ball, M80 and Components					See below NEXT HIGHER ASSEMBLY
CATEGORY						PARAGRAPH REFERENCE / INSPECTION METHOD
	Slug (Dwg. 8595667) Examination for defects		5 1/	Acc-0 Rej-1	3.1	2/
	Jacket (Dwg. 8595668) Examination for defects		5 1/	Acc-0 Rej-1	3.1	2/
	Bullet (Dwg. 8595669) Examination for defects		5 1/	Acc-0 Rej-1	3.1	2/
	Case (Dwg. 10521997) Examination for defects		5 1/	Acc-0 Rej-1	3.1	2/
	Cartridge, 7.62mm, NATO, Ball, M80 Examination for defects Critical defect		15,290	Acc-0 Rej-1	3.1 3.12	Table III
	Major defect		500	Acc-2 Rej-3		3/
	Minor defect		500	Acc-8 Rej-9		3/
1/ Each final station/each machine. 2/ The sample units shall be inspected with standard measuring and test equipment for all mandatory requirements.						

TABLE I. First article inspection

## CLASSIFICATION OF DEFECTS &amp; TESTS

PARAGRAPH	TITLE	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	SHEET 2 OF 5		MIL-C-46931F(AR)	
				AQL OR 100%	REQUIREMENT PARAGRAPH	DRAWING NUMBER	See below NEXT HIGHER ASSEMBLY
CATEGORY						PARAGRAPH REFERENCE / INSPECTION METHOD	
	Cartridge, 7.62mm, NATO, Ball, M80 and Components						
	Bullet extraction		80	Acc-0	3.2	4.5.1	
	Residual stress		80	Rej-1 Acc-0	3.4	4.5.2	
	Action time at 70°F		80	Rej-1 Acc-0	3.8	4.5.5	
	Velocity		40	Rej-1			
	70°F		40	4/	3.7.1.1.5	4.5.6, 4.5.8.1	
	High temperature		40	4/	3.7.1.1.6	4.5.6, 4.5.8.3	
	Low temperature		40	4/	3.7.1.1.6	4.5.6, 4.5.8.2	
	Chamber pressure		40	4/	3.7.1.1.1	4.5.7, 4.5.8.1	
	70°F		40	4/	3.7.1.1.2		
	High temperature		40	4/	3.7.1.1.3	4.5.7, 4.5.8.3	
	Low temperature		40	4/	3.7.1.1.4		
					3.7.1.1.3	4.5.7, 4.5.8.2	
					3.7.1.1.4		
3/ One random sample of 500 cartridges for Major and Minor defects inspection taken from 19,290 cartridges.							

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TABLE I. First article inspection

**CLASSIFICATION OF DEFECTS & TESTS**

PARAGRAPH	TITLE	NO. OF SAMPLE UNITS	EXAMINATION OR TEST	AGL OR 100%	SHEET 3 OF 5	MIL-C-46931F(AR)	
						DRAWING NUMBER	See below NEXT HIGHER ASSEMBLY
CATEGORY						PARAGRAPH REFERENCE / INSPECTION METHOD	
	Cartridge, 7.62mm, NATO, Ball, M80 and Components						
	Port Pressure 700	40		4/	3.8	4.5.10, 4.5.8.1	
	Function an Casualty-Gun machine M60 700F	200		5/	3.7.1.7	4.5.9, 4.5.8.1	
	High temperature	200		5/	3.7.1.7	4.5.9, 4.5.8.3	
	Low temperature	200		5/	3.7.1.7	4.5.9, 4.5.8.2	
	Function an Casualty-Gun machine M134 700F	200		5/	3.7.1.7	4.5.9, 4.5.8.1	
	High temperature	200		5/	3.7.1.7	4.5.9, 4.5.8.3	
	Low temperature	200		5/	3.7.1.7	4.5.9, 4.5.8.2	

NOTES: 4/ The first article sample shall be rejected if the sample fails to comply with the applicable requirement.

5/ The first article sample shall be rejected when function and casualty defects plus firing defects observed on all other firing tests exceed any acceptance numbers listed Table II.

TABLE I. First article inspection

## CLASSIFICATION OF DEFECTS &amp; TESTS

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PARAGRAPH	TITLE	SHEET 4 OF 5			DRAWING NUMBER
	Cartridge, 7.62mm, NATO, Ball, M80 and Components				See below
					NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
	Function and Casualty-Gun machine M240	200	5/	3.7.1.1.7	4.5.9, 4.5.8.1
	High temperature	200	5/	3.7.1.1.7	4.5.9, 4.5.8.3
	Low temperature	200	5/	3.7.1.1.7	4.5.9, 4.5.8.2
	Function and Casualty-Gun machine NF1	100	5/	3.7.1.1.7	4.5.9, 4.5.8.1
	High temperature	100	5/	3.7.1.1.7	4.5.9, 4.5.8.3
	Low temperature	100	5/	3.7.1.1.7	4.5.9, 4.5.8.2
	Function and Casualty-Rifle, M14	160	5/	3.7.1.1.7	4.5.9, 4.5.8.1
	High temperature	120	5/	3.7.1.1.7	4.5.9, 4.5.8.3
	Low temperature	120	5/	3.7.1.1.7	4.5.9, 4.5.8.2
	Function and Casualty-Rifle (LAR), FN	160	4/	3.7.1.1.7	4.5.9, 4.5.8.1
	High temperature	120	4/	3.7.1.1.7	4.5.9, 4.5.8.3
	Low temperature	120	4/	3.7.1.1.7	4.5.9, 4.5.8.2
	Function and Casualty-Rifle, G3A2	160	4/	3.7.1.1.7	4.5.9, 4.5.8.1
	High temperature	120	4/	3.7.1.1.7	4.5.9, 4.5.8.3
	Low temperature	120	4/	3.7.1.1.7	4.5.9, 4.5.8.2

NOTE

NOTE

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TABLE I. First article inspection

## CLASSIFICATION OF DEFECTS &amp; TESTS

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 5 OF 5	DRAWING NUMBER		
	Cartridge, 7.62mm, NATO, Ball, M80 and Components		See below NEXT HIGHER ASSEMBLY		
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
	Waterproof	80	Acc-5 Rej-6 4/	3.4	4.5.3
	Accuracy	180		3.5	4.5.4
	Stripping	150	Acc-0 Rej-1	3.9	4.5.11
	Grain configuration	20	Acc-0 Rej-1	3.11	4.5.13
	Hardness Head	20	Acc-0 Rej-1	3.1	4.5.14.2
	Sidewall	20	Acc-0 Rej-1	3.1	4.5.14.1
	Bullet erosion	15,000	4/	3.10	4.5.12
notes					

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TABLE II  
First Article Acceptance and Rejection  
Numbers for Firing Defects

<u>Defects</u>	<u>Accept</u>	<u>Reject</u>
1. Misfire <u>1</u> /		
a. No vent hole, or obstruction in vent area	0	1
b. Other	0	1
2. Bullet remaining in bore	0	1
3. Hangfire <u>2</u> /	0	1
4. Primer leak		
a. Perforation in firing pin indent in primer cup		
(1) Machine guns (other than M60, M240, M134)	5	6
(2) Rifles (other than M14)	1	2
(3) Machine gun M60, M240, M134	0	1
(4) Rifle, M14	0	1
b. Escape of gas through primer cup other than 4a.	1	2
c. Escape of gas around primer cup	74	75
d. Blown primer	0	1
e. Primer falls out of pocket on retraction of bolt	0	1
f. Primer remains in pocket but is physically loose	1	2
5. Case casualties		
a. Longitudinal split <u>3</u> /		
(1) Neck and Shoulder (I or S)	50	51

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TABLE II  
First Article Acceptance and Rejection  
Numbers for Firing Defects

<u>Defects</u>	<u>Accept</u>	<u>Reject</u>
(2) Body (J)	3	4
(3) Body (K)	1	2
(4) To head (L)	0	1
(5) Through head (M)	0	1
b. Circumferential rupture <u>3/</u>		
(1) Partial, shoulder of body (J & S)	0	1
(2) Partial, body (K)	0	1
(3) Partial, Head (L)	0	1
(4) Complete	0	1
6. Failure to extract	0	1
7. Weapon stoppage <u>4/</u>	0	1
Total of defects 4a.(1), 4a.(2), 4c., & 5a(1)	75	76
Total of all other listed defects	7	8

1/ Each cartridge that misfires shall be disassembled and examined for the presence of the vent hole in the primer pocket or any obstruction in the vent hole area of the primer pocket that can be assignable as the cause for the misfire. If the vent hole is missing or obstructed, the first article quantity shall be rejected.

2/ For the definition of a hangfire, see SCATP-7.62 paragraph 10.6.2.

3/ For location of defects indicated by letters in parentheses, see, Dwg. 7643674.

4/ All stoppages attributable to the ammunition, with the exception of misfire, complete rupture and failure to extract, observed in all tests shall be included.

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4.4 Quality conformance inspection.4.4.1 Lot formation. In accordance with MIL-A-48078.

4.4.1.1 Lot submission. The cartridge shall be submitted in accordance with MIL-STD-105, Inspection Level II.

4.4.1.2 Component parts. Unless otherwise specified, component parts shall be homogeneous and of a size convenient to the contractor and inspected, tested and accepted by the contractor. The cartridge lot shall contain:

a. Cartridge cases from one unchanged process and from one manufacturer.

b. Bullets from one unchanged process and from one manufacturer.

c. Primers from one lot interfix number and from one manufacturer.

d. Propellant from no more than two lot numbers and from one manufacturer.

4.4.1.3 Lot identification. Each lot of ammunition shall be identified as to type, caliber and model, lot number in accordance with MIL-STD-1168 and the supplier's identification as assigned by the procuring activity.

4.4.2 Examination for defects.

a. Major and minor defects. Examination for major and minor defects shall be performed on a class basis in accordance with classification of defects, (see Table III) using applicable sampling plans and acceptance criteria of MIL-STD-105. The acceptable quality level (AQL) for the major class shall be 0.25% and the minor class shall be 1.50% except for workmanship which shall be 2.5%. All nonconforming cartridges shall be reflected.

b. Critical defects. Unless otherwise specified, one hundred percent examination shall be performed for all critical defects. If a visual critical defect is found in a sample either just prior to a firing test or after a firing test (and the defect is not due to the firing), the lot shall be rejected. The lot shall then be rescreened and resubmitted for visual inspection of critical defects. If a critical defect is found during packing, the portion of the lot that has been packed or is in the process of being packed shall be rejected. In addition, the portion of the lot remaining to be packed shall be rejected. The lot shall then be rescreened and resubmitted for visual inspection of critical defects.



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TABLE IIIQuality conformance classification of defects

<u>No.</u>	<u>Defect and Method of Inspection</u>	<u>Critical</u>	<u>Major</u>	<u>Minor</u>	<u>Major or Minor</u>
	<u>Visual 1/</u>				
	CARTRIDGE				
1.	Discolored, dirty, oil, smeared			X	
2.	Corroded or stained, if etched		X		
3.	Mixed ammunition types (see 4.4.4)	X	X		
3a.	Missing or partially missing paint identification (see MIL-STD-636)				X
	CASE				
4.	Round head		X		
5.	Dent				X
6.	Spilt case in K, L or M location	X			
	in I, L or J location	X			
7.	Perforated case	X			
8.	Draw scratch				X
9.	Scratch			X	
10.	Beveled underside of head		X		
11.	Case mouth not crimped in cannelure		X		
12.	Scaly metal				X
13.	No chamfer on head (rim)		X		
14.	Fold			X	
15.	Wrinkle			X	
16.	Buckle			X	
17.	Bulge			X	
18.	Illegible or missing head stamp			X	
19.	Defective head			X	
20.	Defective mouth			X	
21.	No visible evidence of mouth anneal		X		
	BULLET				
22.	Dent			X	
23.	Scratch			X	
24.	Split bullet jacket		X		
25.	Loose bullet		X		
26.	Missing cannellure		X		
27.	Scaly metal (bullet)			X	

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TABLE III  
(continued)

<u>No.</u>	<u>Defect and Method of Inspection</u> <u>Visual 1/</u>	<u>Critical</u>	<u>Major</u>	<u>Minor</u>	<u>Major or Minor</u>
28.	Upset (crooked) point			X	
29.	Exposed steel (clad jacket)			X	
30.	Blunt point			X	
31.	Defective cannellure			X	
	PRIMER				
32.	No primer	X			
33.	Cocked primer	X			
34.	Inverted primer	X			
35.	Loose primer		X		
36.	Nicked or dented primer			X	
37.	No waterproofing material (primer pocket joint)			X	
38.	Defective crimp			X	
	GAGING				
39.	Total length		X		
40.	Cartridge profile failure (requiring more than 20 lbs dead weight to insert in profile and alignment gage)		X		
41.	Diameter of extractor groove, max.		X		
42.	Diameter of extractor groove, min.			X	
43.	Diameter of head		X		
44.	Thickness of head		X		
45.	Length of shoulder datum		X		
46.	Depth of primer		X		
	WEIGHING				
47.	Weight, min 2/	X			
	OTHER				
48.	Workmanship (see 3.12 and 4.4.2a)			X	

1/ Refer to MIL-STD-636 for visual defect standards for defects 1 through 38.

2/ Each lightweight cartridge shall be disassembled and the propellant weighed. Each such cartridge found to contain 25 grains or more of propellant shall be classed as a major defect. Any cartridge containing less than 25 grains of propellant shall be classed as a critical defect.

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4.4.3 Tests. The tests listed in Table IV shall be conducted in accordance with the methods and procedures specified in 4.5.

4.4.3.1 Test samples. The quantities for the various tests shall be as specified in Table IV. Only cartridges having met the visual, dimensional and weight requirements shall be used in the ballistic tests and shall have been selected in such a manner that the sample is representative of the entire lot. The cartridges shall be thoroughly mixed before being divided into samples for the various tests.

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TABLE IVQuality Conformance Test Samples

	Ambient Temper- ature	70 +20°F <u>4.5.8.1</u>	Low temper- ature (see <u>4.5.8.2</u> )	High temper- ature (see <u>4.5.8.3</u> )	Requirement paragraph
Bullet					
extraction <u>1/</u>	25				3.2
Residual stress					
(mercurous					
nitrate) <u>1/</u>	50				3.3
Waterproof <u>2/</u>	50				3.4
Accuracy <u>3/</u>	90				3.5
Stripping <u>4/</u>	100				3.9
Barrel Erosion					
<u>5/</u>	15,000				3.10
Grain con-					
figuration <u>1/</u>	10				3.11
Hardness:					
Head <u>6/</u>	10				3.1
Sidewall <u>3/</u>	10				3.1
Function &					
Casualty <u>7/</u> :					3.7.1.7
Gun, machine					
M60	150	150	150		
Gun, machine,					
M240	150	150	150		
Gun, automatic,					
M134	200	200	200		
Rifle, M14	120	80	80		
Rifle, (LAR),					
FN	120	80	80		
Rifle, G3A2	120	80	80		
Gun, machine,					
NF1	100	100	100		
Measurement by					
copper-crush					
cylinder:					
Action time <u>1/</u>	50				3.6
Velocity <u>8/</u>	20	20		20	3.9.1.5, 3.9.1.6
Chamber					
pressure <u>8/</u>	20	20		20	3.9.1.1, 3.9.1.3

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TABLE IVQuality Conformance Test Samples

	Ambient Temper- ature	70 $\pm$ 2°F <u>4.5.8.1</u>	Low temper- ature (see <u>4.5.8.2</u> )	High temper- ature (see <u>4.5.8.3</u> )	Requirement paragraph
Port pressure <u>3/</u>		20			3.8.1
Measurement by EPVAT <u>9/</u>		30	30	30	
Action time <u>1/</u>		--	--	--	3.6
Velocity <u>8/</u>		--	--	--	3.9.1.5
					3.9.1.6
Chamber pressure <u>8/</u>		--	--	--	3.9.1.2, 3.9.1.4
Port pressure <u>3/</u>		--	--	--	3.8.2

1/ Failure of two or more cartridges to comply with the applicable requirement shall be cause for rejection of the lot. If one cartridge fails in the first test a second sample consisting of double the number of cartridges in the first sample shall be tested. If any failing cartridges are found in the second sample, the lot shall be rejected.

2/ Failure of ten or more cartridges to comply with the applicable requirement shall be cause for rejection of the lot. If more than three but less than ten cartridges fail in the first test, a second sample consisting of double the number of cartridges in the combined first sample shall be tested. The lot shall be rejected if in the first and second sample, ten or more cartridges fail to comply with the applicable requirements.

3/ Failure of the cartridges to comply with the applicable requirement shall be cause for rejection of the lot subject to testing of a second sample consisting of double the quantity of cartridges used in the first test. Failure of the cartridges in the second sample to comply with the applicable requirement shall be cause for rejection of the lot.

4/ Any evidence of stripping indicated by any irregular perforations on the paper screens shall be cause for rejection of the lot subject to testing of a second sample, consisting of

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double the quantity of cartridges used in the first test. Any evidence of stripping in the second sample shall be cause for rejection of the lot.

5/ This test shall be conducted on the initial production sample only.

6/ Failure of one or more cartridges to comply with the applicable requirements shall be cause for rejection of the lot. No second sample permitted.

7/ The lot shall be rejected when function and casualty defects plus firing defects observed in all other firing tests (excluding erosion tests) exceed the acceptance number for the cumulative sample in Table V. If the number of defects found in the first test (excluding erosion tests) exceeds the acceptance number for the first sample, but is equal to or less than the acceptance number for the cumulative sample, a second sample, consisting of double the quantities specified under function and casualty test, shall be fired in all the service weapons specified. This procedure shall apply regardless of the weapon or weapons in which the firing defects occurred in the first test. If the total number of defects in the combined first and second sample exceeds the acceptance number for the cumulative sample, the lot shall be rejected. If, in testing a second sample, defects other than those for which the second sample is being tested should occur to the extent that they exceed the acceptance number for the cumulative sample, the lot shall be rejected.

8/ Failure of the cartridges in any sample to comply with the applicable requirement shall be cause for rejection of the lot, subject to testing of a second sample consisting of double the quantity of cartridges used in the first test for the temperature or temperatures at which the failure occurred. Failure of the cartridges of the second sample to comply with the applicable requirement shall be cause for rejection of the lot.

9/ EPVAT test method for chamber pressure, port pressure, velocity and action time shall be performed simultaneously at all temperatures except for action time and port pressure which are performed only at 70°F.

4.4.3.2 Firing defects. Firing defects and acceptance numbers shall be as specified in Table V.

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TABLE VQuality Conformance Acceptance Numbers for Firing Defects

Defects	<u>ACCEPTANCE NUMBER</u> <u>COPPER-CRUSH CYL.</u>		<u>ACCEPTANCE NUMBER</u> <u>EPVAT</u>	
	First Sample <u>1/</u>	Cumulative (1st & 2nd Sample) <u>1/</u>	First Sample <u>1/</u>	Cumulative (1st & 2nd Sample) <u>1/</u>
1. Misfire <u>2/</u>				
a. No vent hole, or obstruction in vent area <u>3/</u>	0	-	0	-
b. Other	1	2	1	2
2. Bullet remaining in bore <u>3/</u>	0	-	0	-
3. Hangfire <u>4/</u>	0	-	0	-
4. Primer leak				
a. Perforation in firing pin indent in primer cup				
(1) Machine guns (other than M60, M240 and M134)	6	14	6	14
(2) Rifles (other than M14)	2	4	2	4
(3) Machine gun M60, M240 and M134 <u>5/</u>	0	-	0	-
(4) Rifle, M14 <u>5/</u>	0	-	0	-
b. Escape of gas through primer cup other than 4a.	1	2	1	2
c. Escape of gas around primer cup <u>6/</u>	78(61)	187(140)	75(58)	184(137)
d. Blown primer	0	1	0	1

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TABLE VQuality Conformance Acceptance Numbers for Firing Defects

Defects	<u>ACCEPTANCE NUMBER</u> <u>COPPER-CRUSH CYL.</u>		<u>ACCEPTANCE NUMBER</u> <u>EPVAT</u>	
	<u>First</u>	<u>Cumulative</u>	<u>First</u>	<u>Cumulative</u>
	<u>Sample</u> <u>1/</u>	<u>(1st &amp; 2nd</u> <u>Sample) 1/</u>	<u>Sample</u> <u>1/</u>	<u>(1st &amp; 2nd</u> <u>Sample 1/</u>
-----				
e. Primer falls out of pocket on retraction of bolt	0	1	0	1
f. Primer remains in packet but is physically loose	2(1)	5(2)	2(1)	5(2)
5. Case casualties				
a. Longitudinal split 7/ (1) Neck & Shoulder (I or S)	53(42)	131(97)	51(40)	129(95)
(2) Body (J)	4(2)	7(6)	4(2)	7(6)
(3) Body (K)	1	2	1	2
(4) To head (L)	0	1	0	1
(5) Through head (M)	0	1	0	1
b. Circumferential rupture 7/ (1) Partial, shoulder of body (J&S)	1	2	1	2
(2) Partial, body (K)	0	1	0	1
(3) Partial, Head (L)	0	1	0	1
(4) Complete	0	1	0	1
6. Failure to extract	0	1	0	1
7. Weapon stoppage 8/	0	1	0	1
Total of defects 4a. (1), 4a.(2), 4c., & 5a(1)	79(61)	188(143)	76(58)	185(140)
Total of all other listed defects	8(6)	17(13)	8(6)	17(13)



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1/ Numbers in parentheses indicate acceptance numbers to be applied during reduced testing when function and casualty testing is conducted only in the M60 Machine Gun, M240 Machine Gun, M134 Automatic Gun and M14 Rifle (see 4.5.9.2).

2/ Each cartridge that misfires shall be disassembled and examined for presence of vent hole in primer pocket or any obstruction in the vent hole area of the primer pocket that can be assignable as the cause for misfire. If the vent hole is missing or obstructed, the lot shall be rejected with no second sample permitted.

3/ No second sample permitted. Lot shall be rejected.

4/ For the definition of a hangfire, see SCATP-7.62 paragraph 10.6.2.

5/ If one or more defects are found in the first sample, a second sample shall be fired in the weapon(s) in which the defect occurred. The second sample shall consist of double the quantity of cartridges specified under function and casualty of Table IV for such weapons(s). Prior to the testing of the second sample, the firing pin of the specified weapons(s) in which the defect originally occurred shall be replaced by a new firing pin. If an additional primer perforation is found in the second sample, the lot shall be rejected.

6/ The total number of cases in which the escape of gas is 50% or more around the periphery of the primer cup shall not exceed 24 for the first sample nor more than 56 for the cumulative sample. When Note 1/ applies, the total number of cases in which the escape of gas is 50% or more around the primer cup periphery shall not exceed 19 for the first sample nor more than 42 for the cumulative sample.

7/ For location of defects indicated by letters in parentheses, see Dwg. 7643674.

8/ All stoppages attributable to the ammunition, with the exception of misfire, complete rupture or failure to extract, observed in all tests shall be included.

4.4.4 Packaging, packing and marking inspection. During or immediately prior to the packaging operation, 100 percent examination of the cartridges shall be performed to ascertain that the cartridge type conforms to the drawing. Occurrence of a high pressure test, dummy, blank, grenade trace or overhead fire trace cartridges shall be classed as a critical defect. Occurrence of any other incorrect type shall be classed as a major defect. All

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non-conforming cartridges shall be rejected. Inspection for packaging, packing and marking shall be in accordance with MIL-STD-644 as applicable to the drawing.

4.4.5 Inspection equipment. The inspection equipment required to perform the inspections and test prescribed herein is described in the Index of Inspection Equipment List LI-10521998. The contractor shall submit for approval inspection equipment designs in accordance with the terms of the contract. See Section 6 of MIL-A-48078 and 6.2 herein.

#### 4.5 Methods of Inspection.

4.5.1 Bullet extraction. The cartridges shall be tested in an approved bullet extractor machine. The rate of travel of the test head shall be not less than three nor more than six inches per minute. The test shall be conducted in accordance with SCATP-7.62.

4.5.2 Residual stress (mercurous nitrate). The test shall be conducted in accordance with SCATP-7.62.

4.5.3 Waterproof. The test shall be conducted in accordance with SCATP-7.62. The container shall be evacuated to a pressure of 7 1/2 pounds per square inch (15 inches of mercury) below atmospheric pressure, and held at that pressure for 30 seconds.

4.5.4 Accuracy. The test shall be conducted in accordance with SCATP-7.62, utilizing the longest range available up to 600 yards. Ranges shorter than 200 yards shall not be used. When accuracy testing is conducted on ranges shorter than 600 yards, the average of the mean radii of the targets shall be multiplied by the applicable conversion factor given below:

Range (yards)	200	300	400	500
Factor	3.20	2.13	1.60	1.28

4.5.5 Action time. The test shall be conducted in accordance with SCATP-7.62.

4.5.6 Velocity. The test shall be conducted in accordance with SCATP-7.62.

4.5.7 Chamber pressure. The test shall be conducted in accordance with SCATP-7.62.

4.5.8 Temperature tests. The tests shall be conducted in accordance with SCATP-7.62. The weapon or weapons in which these tests are fired shall be at room temperature. Prior to firing, reference cartridges shall be conditioned at 68°F to 72°F, for not less than two hours and fired at that temperature.

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4.5.8.1 70° Fahrenheit test. The test sample shall be conditioned at 70°F, plus or minus 2°F for not less than two hours and shall be fired at that temperature.

4.5.8.2 -65° Fahrenheit test. The test samples shall be conditioned at minus 65 degrees F., plus or minus 5 degrees F., for not less than 6 hours and shall be fired at that temperature.

4.5.8.3 +125° Fahrenheit test. The test sample shall be conditioned at 125 degrees F., plus or minus 2 degrees F., for 4 to 12 hours and shall be fired at that temperature.

4.5.9 Function and casualty test. The test shall be conducted in accordance with SCATP-7.62 and 4.5.9.1. One weapon of each type shall be used.

4.5.9.1 Gun automatic, M134. The gun automatic, M134 shall maintain a cyclic rate of 6000 rounds per minute. Barrels shall be replaced after firing 60,000 cartridges (10,000 cartridges per barrel). Firing shall be in 200 round bursts, with cooling to ambient temperature between bursts.

4.5.9.2 Reduced testing for function and casualty. When five consecutive production lots have successfully met the criteria of Table V, testing for function and casualty shall be reduced. The reduced plan shall consist of testing one out of every ten lots in all the weapons prescribed in Table IV, using the sample quantities specified herein. The lots to be tested in this manner shall be selected randomly. The remaining nine lots shall be tested only in the M60 Machine Gun, M240 Machine Gun, M134 Automatic Gun and M14 Rifle using sample quantities specified in Table IV. Failure of any lot to meet acceptance criteria of Table V during reduced testing shall be cause for reinstatement of lot-by-lot testing in all prescribed weapons. When five consecutive lots thereafter have met the criteria of Table V, the reduced testing described above shall be resumed.

4.5.10 Port pressure. The test shall be conducted in accordance with SCATP-7.62.

4.5.11 Stripping test. The test shall be conducted in accordance with SCATP-7.62. Machine guns, M60 and M240 shall be used with a 50 round burst being fired in each gun.

4.5.12 Barrel erosion. The test shall be conducted in accordance with SCATP-7.62 and the following: Firing in any barrel shall be terminated when either the drop in average velocity of an individual burst or the percentage of keyholing bullets in an individual burst exceeds the limits specified in 3.10.

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4.5.13 Grain configuration. The test samples shall be prepared and evaluated in accordance with MIL-STD-1170.

4.5.14 Hardness testing. The bullets shall be extracted, propellant removed and the primers extracted. Each cartridge case of the sample shall be prepared and placed on the appropriate test fixture for testing in accordance with ASTM-E92.

4.5.14.1 Case sidewall. The average of the hardness values of the sample cases for each prescribed point along the sidewall exterior surface shall be computed and charted in accordance with the drawing requirements.

4.5.14.2 Case head. The individual hardness value for each prescribed point on the head section of each sample case shall be recorded. Any value failing to meet the drawing requirement at a prescribed point(s) shall be cause for remeasurement of hardness at the corresponding point(s) on the opposite side of the primer pocket of the same head section from which the initial value was obtained. The higher of the two measurements shall be recorded as the value of record for determination of conformance to drawing requirements.

4.5.15 Defect penalty. In any ballistic test except function and casualty, in which the occurrence of a firing defect listed in Table V prevents the obtaining of a reliable result for the characteristic being tested, an additional shot shall be fired. That particular test shall not be penalized, but the total ballistic sample shall be penalized for such defects in accordance with Table V.

## 5. PACKAGING.

### 5.1 Preservation and packing.

5.1.1 Packing, level A. The cartridges shall be packed in accordance with drawings 9362607, 7553708, 8593306, 8597306, 10521861 or 10535780 as appropriate.

5.1.2 Marking. Markings shall be in accordance with Dwgs. 9352607, 7553708, 8593306, 8597306, 10521861 or 10535781 as appropriate.

5.2 Shipping. When cartridges from more than one lot are shipped at one time, each lot shall be kept separate and the division between lots clearly indicated to prevent mixing of the lots in transit.

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## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The cartridges covered by this specification is intended for use in 7.62mm weapons.

6.2 Acquisition requirements. Ordering data should include:

- a. Title, number and date of this specification.
- b. Type and level of packing for the cartridge.
- c. Provisions for the submission of Inspection Equipment Designs, See 6.3.

6.3 Submission of inspection equipment designs for approval. Submit equipment designs as required to Commander, U.S. Army ARDEC, ATTN: AMSMC-QAF-I(D), Picatinny Arsenal, NJ, 07806-5000. Request letter of submittal shall state the contractor, contract number, specification number, item nomenclature and classification of defects or tests. This address will be specified on the Contract Data Requirements List in the contract.

6.4 Hazard notice. The cartridge described herein and certain of its components are flammable and explosive and consequently present hazards in manufacture, handling, storage and shipment. The contractor should recognize these hazards and take appropriate measures to guard and protect against fire, explosion adverse environment, corrosive atmosphere, rough handling and electrically induced incidents.

6.5 Drawings. Drawings listed in Section 2 of this specification under the heading US Army Armament Research, Development and Engineering Center (ARDEC) may also include drawings, prepared by, and identified as Edgewood Arsenal, Frankford Arsenal, Rock Island Arsenal, ARDEC, ARRADCOM, or Picatinny Arsenal drawings. Technical data originally prepared by these activities are now under the cognizance of ARDEC.

6.6 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issues due to the extensiveness of the changes.

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6.7 Subject term (key word) listing.

Ammunition, 7.62mm  
 Ball, M80 Ammunition  
 Function and Casualty Tests  
 Small Arms Ammunition

6.8 International agreements. Certain provisions of this specification are the subject of international standardization agreements listed below. When amendment, revision or cancellation of this specification is proposed which will affect or violate the International Agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including Departmental Standardization Offices, if required.

NATO STANAG  
 2310  
 2315  
 2316  
 2320

ABCA-ARMY-STD  
 123  
 124

Custodian:  
 Army-AR

Preparing activity:  
 Army-AR

(Project 1305-AD56)

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

<b>I RECOMMEND A CHANGE:</b>		1. DOCUMENT NUMBER MIL-C-46931F(AR)	2. DOCUMENT DATE (YYMMDD) 29 March 1991
3. DOCUMENT TITLE CARTRIDGE, 7.62MM: NATO, BALL, M80			
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets if needed.)			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME (Last, First, Middle Initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME US ARMY ARDEC STANDARDIZATION OFFICE		b. TELEPHONE (Include Area Code) (1) Commercial (201) 724-6671 (2) AUTOVON 880-6671	
c. ADDRESS (Include Zip Code) ATTN: SMCAR-BAC-S PICATINNY ARSENAL, NJ 07806-5000		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	